

Title (en)  
VERTICAL EMISSION CASCADE LASERS

Title (de)  
KASKADENLASER MIT VERTIKALER EMISSION

Title (fr)  
LASERS EN CASCADE À ÉMISSION VERTICALE

Publication  
**EP 4246741 A1 20230920 (EN)**

Application  
**EP 22162017 A 20220315**

Priority  
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Abstract (en)  
A vertical emission cascade laser (10) comprising an in-plane waveguide formed by a lower cladding layer (14), active region layers (15) and an upper cladding layer (16). A disk-shaped side surface (33) laterally bounds the in-plane waveguide and has a mirror layer (39) arranged over it to form a cavity capable of supporting multiple radial modes. An in-plane grating structure (28; 28, 29) of concentric rings is formed in one of the cladding layers (14, 16), the grating structure functioning both to select one of the multiple radial cavity modes for lasing and also to couple out the laser light through the lower and/or upper cladding layer (14, 16). The grating structure includes at least a higher order grating portion of order  $m \geq 2$  and optionally also a first order grating portion with  $m = 1$ .

IPC 8 full level  
**H01S 5/187** (2006.01); **H01S 5/028** (2006.01); **H01S 5/34** (2006.01); **H01S 5/12** (2021.01)

CPC (source: EP)  
**H01S 5/028** (2013.01); **H01S 5/187** (2013.01); **H01S 5/3402** (2013.01); **H01S 5/0282** (2013.01); **H01S 5/0287** (2013.01); **H01S 5/1203** (2013.01); **H01S 5/1215** (2013.01); **H01S 5/3422** (2013.01)

Citation (applicant)  
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Designated contracting state (EPC)  
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR

Designated extension state (EPC)  
BA ME

Designated validation state (EPC)  
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